What is claimed is

1. A method for making nanogels comprising the steps of

a) providing a monomer;

b) copolymerizing the monomer with a crosslinker to form a crosslinked hydrogel;

c) liquefying the crosslinked hydrogel to form a copolymer solution;

d) diluting the copolymer solution to form a diluted copolymer solution; and

e) gelling the diluted copolymer solution to form the hydrogel nanoparticles.

2. The method of claim 1, wherein the monomer is selected from the group consisting of acrylamide, N-ornithine acrylamide, N-(2-hydroxypropyl)acrylamide, hydroxy-ethylacrylate, hydroxyethylmethacrylate, polyethyleneglycol acrylates, polyethyleneglycol methacrylates, N-vinyl pyrolidone, N-phenylacrylamide, dimethylaminopropyl methacrylamide, acrylic acid, benzylmethacrylamide, methylthioethylacrylamide, and combinations thereof.

3. The method of claim 1, wherein the crosslinker is selected from the group consisting of N, N'-bis(acryloyl)cystamine, vinyl groups, allyl groups, cinnamates, acrylates, diacrylates, oligoacrylates, methacrylates, dimethacrylates, oligomethoacrylates, methylenebisacrylamide, methylenebismethacrylamide, esters of unsaturated mono- or polycarboxylic acids with polyols, trimethylolpropane triacrylate, allyl compounds, vinyl compounds, stilbene derivatives, azo derivatives, cinnamoyl derivatives, and combinations thereof.

4. The method of claim 1, wherein the crosslinker is a disulfide linker.

5. The method of claim 1, wherein step c) is accomplished with a reducing agent.

6. The method of claim 5, wherein the reducing agent is selected from the group consisting of 2-mercaptoethanol, dithiothreitol, dithioerythritol, cystein, butanethiol, sodium borohydride, and cyanoborohydride.

7. The method of claim 1, wherein step e) is accomplished with atmospheric oxygen.

8. The method of claim 1, wherein step e) is accomplished at neutral pH.

9. The method of claim 1, further comprising the step of concentrating and freeze drying the hydrogel nanoparticles.

10. The method of claim 1, wherein the nanogels are hydrophobic.

11. The method of claim 1, wherein the nanogels are hydrophilic.

12. The method of claim 1, wherein the nanogels are anionic.

13. The method of claim 1, wherein the nanogels are cationic.

14. The method of claim 1, wherein step b) is followed immediately by washing of the crosslinked hydrogel to remove any unreacted monomer.

15. The method of claim 1, wherein step d) comprises diluting the copolymer solution to a concentration of less than 0.1 percent (w/v).

16. The method of claim 1, wherein the liquefying and gelling steps are accomplished by reduction and oxidation, respectively.

17. The method of claim 1, wherein the liquefying and gelling steps are accomplished by irradiation at different wavelengths.

18. The method of claim 1, wherein metal nanoparticles are added to the diluted copolymer solution prior to performing step e).

19. The method of claim 18, wherein the metal is gold.

20. A hydrogel nanocomposite comprising a hydrogel having nanoparticles dispersed therein.

21. The hydrogel nanocomposite of claim 20, wherein the hydrogel is a reversible hydrogel.

22. The hydrogel nanocomposite of claim 20, wherein the nanoparticles is selected from the group consisting of nanogel, protein, silica, gold, silver, TiO2, any transition metals, ceramic, or combinations thereof.

23. The hydrogel nanocomposite of claim 20, wherein the nanoparticles do not disperse or scatter visible light.

24. The hydrogel nanocomposite of claim 20, wherein the nanoparticles have particle sizes less than about 150 nm.

25. The hydrogel nanocomposite of claim 20, wherein the nanoparticles have particle sizes of about 3-20 nm.

26. The hydrogel nanocomposite of claim 20, wherein the hydrogel is reversible and comprises a copolymer, wherein said copolymer is a hydrogel when in an oxidized state and is a solution when in a reduced state.

27. The hydrogel nanocomposite of claim 26, wherein the copolymer is produced by polymerization of a monomer with a crosslinker or a polymer derivatized to contain reversible crosslinking.

28. The hydrogel nanocomposite of claim 26, wherein the monomer is selected from the group consisting of acrylamide, N-ornithine acrylamide, N-(2-hydroxypropyl)acrylamide, hydroxy-ethylacrylate, hydroxyethylmethacrylate, polyethyleneglycol acrylates, polyethyleneglycol methacrylates, N-vinyl pyrolidone,

N-phenylacrylamide, dimethylaminopropyl methacrylamide, acrylic acid, benzylmethacrylamide, and methylthioethylacrylamide.

29. The hydrogel nanocomposite of claim 26, wherein the crosslinker is selected from the group consisting of N, N'-bis(acryloyl)cystamine, vinyl groups, allyl groups, cinnamates, acrylates, diacrylates, oligoacrylates, methacrylates, dimethacrylates, oligomethoacrylates, methylenebisacrylamide, methylenebismethacrylamide, esters of unsaturated mono- or polycarboxylic acids with polyols, trimethylolpropane triacrylate, allyl compounds, vinyl compounds, stilbene derivatives, azo derivatives, cinnamoyl derivatives, and combinations thereof.

30. The hydrogel nanocomposite of claim 26, wherein the crosslinker is a disulfide linker.

31. The hydrogel nanocomposite of claim 20, wherein the hydrogel can be reduced to form a solution.

32. The hydrogel nanocomposite of claim 31, wherein the hydrogel can be reduced by the addition of a reducing agent.

33. The hydrogel nanocomposite of claim 31, wherein the solution can be oxidized to reform the hydrogel.

34. The hydrogel nanocomposite of claim 33 wherein the solution can be oxidized by atmospheric oxygen, or light and riboflavin.

35. The hydrogel nanocomposite of claim 20, wherein the hydrogel comprises a copolymer, wherein said copolymer forms a hydrogel when exposed to light at a first wavelength and forms a solution when exposed to light at a second wavelength.

36. The hydrogel nanocomposite of claim 20, wherein the refractive index of the hydrogel nanocomposite can be changed by changing the concentration of nanoparticles in the hydrogel.

37. The hydrogel nanocomposite of claim 20, wherein the nanoparticles are selected from the group consisting of nanogels, proteins, silica, metals, such as gold, silver, and any transition metals, TiO_2, ceramics, or combinations thereof.

38. A method of making a hydrogel nanocomposite comprising the steps of

a) providing a reversible hydrogel in liquid state;

b) adding nanoparticles to the reversible hydrogel in liquid state to form a dispersion; and

c) gelling the dispersion.

39. The method of claim 38, wherein the nanoparticles is selected from the group consisting of nanogel, protein, silica, gold, silver, TiO2, any transition metals, ceramic, or combinations thereof.

40. The method of claim 38, wherein the nanoparticles do not disperse or scatter visible light.

41. The method of claim 38, wherein the nanoparticles have particle sizes less than about 150 nm.

42. The method of claim 38, wherein the nanoparticles have particle sizes of about 3-20 nm.

43. The method of claim 38, wherein the hydrogel is reversible and comprises a copolymer, wherein said copolymer is a hydrogel when in an oxidized state and is a solution when in a reduced state.

44. The method of claim 43, wherein the copolymer is produced by polymerization of a monomer with a crosslinker or a polymer derivatized to contain reversible crosslinking.

45. The method of claim 44, wherein the monomer is selected from the group consisting of acrylamide, N-ornithine acrylamide, N-(2-hydroxypropyl)acrylamide, hydroxy-ethylacrylate, hydroxyethylmethacrylate, polyethyleneglycol acrylates, polyethyleneglycol methacrylates, N-vinyl pyrolidone, N-phenylacrylamide, dimethylaminopropyl methacrylamide, acrylic acid, benzylmethacrylamide, and methylthioethylacrylamide.

46. The method of claim 44, wherein the crosslinker is N, N'-bis(acryloyl)cystamine.

47. The method of claim 44, wherein the crosslinker is a disulfide linker.

48. The method of claim 38, wherein the hydrogel comprises a copolymer, wherein said copolymer forms a hydrogel when exposed to light at a first wavelength and forms a solution when exposed to light at a second wavelength.

49. The method of claim 38, wherein the refractive index of the hydrogel nanocomposite can be changed by changing the concentration of nanoparticles in the hydrogel.

50. The method of claim 38, wherein the nanoparticles are selected from the group consisting of nanogels, proteins, silica, metals, such as gold, silver, and any transition metals, TiO_2, ceramics, or combinations thereof.

51. An accommodating intraocular lens formed by *in situ* gelation of a hydrogel nanocomposite of claim 20.

52. The accommodating intraocular lens of claim 51, wherein the hydrogel is a reversible hydrogel.

53. The accommodating intraocular lens of claim 51, wherein the nanoparticles is selected from the group consisting of nanogel, protein, silica, gold, silver, TiO2, any transition metals, ceramic, or combinations thereof.

54. The accommodating intraocular lens of claim 51, wherein the nanoparticles do not disperse or scatter visible light.

55. The accommodating intraocular lens of claim 51, wherein the nanoparticles have particle sizes less than about 150 nm.

56. The accommodating intraocular lens of claim 51, wherein the nanoparticles have particle sizes of about 3-20 nm.

57. The accommodating intraocular lens of claim 51, wherein the hydrogel is reversible and comprises a copolymer, wherein said copolymer is a hydrogel when in an oxidized state and is a solution when in a reduced state.

58. The accommodating intraocular lens of claim 57, wherein the copolymer is produced by polymerization of a monomer with a crosslinker or a polymer derivatized to contain reversible crosslinking.

59. The accommodating intraocular lens of claim 58, wherein the monomer is selected from the group consisting of acrylamide, N-ornithine acrylamide, N-(2-hydroxypropyl)acrylamide, hydroxy-ethylacrylate, hydroxyethylmethacrylate, polyethyleneglycol acrylates, polyethyleneglycol methacrylates, N-vinyl pyrolidone, N-phenylacrylamide, dimethylaminopropyl methacrylamide, acrylic acid, benzylmethacrylamide, and methylthioethylacrylamide.

60. The accommodating intraocular lens of claim 58, wherein the crosslinker is selected from the group consisting of N, N'-bis(acryloyl)cystamine, vinyl groups, allyl groups, cinnamates, acrylates, diacrylates, oligoacrylates, methacrylates, dimethacrylates, oligomethoacrylates, methylenebisacrylamide, methylenebismethacrylamide, esters of unsaturated mono- or polycarboxylic acids with polyols, trimethylolpropane triacrylate, allyl compounds, vinyl compounds, stilbene derivatives, azo derivatives, cinnamoyl derivatives, and combinations thereof.

61. The accommodating intraocular lens of claim 58, wherein the crosslinker is a disulfide linker.

62. The accommodating intraocular lens of claim 51, wherein the hydrogel can be reduced to form a solution.

63. The accommodating intraocular lens of claim 62, wherein the hydrogel can be reduced by the addition of a reducing agent.

64. The accommodating intraocular lens of claim 62, wherein the solution can be oxidized to reform the hydrogel.

65. The accommodating intraocular lens of claim 64, wherein the solution can be oxidized by atmospheric oxygen, or light and riboflavin.

66. The accommodating intraocular lens of claim 51, wherein the hydrogel comprises a copolymer, wherein said copolymer forms a hydrogel when exposed to

light at a first wavelength and forms a solution when exposed to light at a second wavelength.

67. The accommodating intraocular lens of claim 51, wherein the refractive index can be changed by changing the concentration of nanoparticles in the hydrogel.

68. The accommodating intraocular lens of claim 51, wherein the nanoparticles are selected from the group consisting of nanogels, proteins, silica, metals, such as gold, silver, and any transition metals, TiO_2, ceramics, or combinations thereof.

69. A method of forming a hydrogel *in situ* in an eye comprising the steps of

a) providing a reversible hydrogel in liquid state;

b) adding nanoparticles to the reversible hydrogel in liquid state to form a dispersion;

c) introducing the dispersion into the capsular bag; and

c) gelling the dispersion inside the capsular bag.

70. The method of claim 69, wherein the hydrogel is a reversible hydrogel.

71. The method of claim 69, wherein the nanoparticles is selected from the group consisting of nanogel, protein, silica, gold, silver, TiO2, any transition metals, ceramic, or combinations thereof.

72. The method of claim 69, wherein the nanoparticles do not disperse or scatter visible light.

73. The method of claim 69, wherein the nanoparticles have particle sizes less than about 150 nm.

74. The method of claim 69, wherein the nanoparticles have particle sizes of about 3-20 nm.

75. The method of claim 69, wherein the hydrogel is reversible and comprises a copolymer, wherein said copolymer is a hydrogel when in an oxidized state and is a solution when in a reduced state.

76. The method of claim 75, wherein the copolymer is produced by polymerization of a monomer with a crosslinker or a polymer derivatized to contain reversible crosslinking.

77. The method of claim 76, wherein the monomer is selected from the group consisting of acrylamide, N-ornithine acrylamide, N-(2-hydroxypropyl)acrylamide, hydroxy-ethylacrylate, hydroxyethylmethacrylate, polyethyleneglycol acrylates, polyethyleneglycol methacrylates, N-vinyl pyrolidone, N-phenylacrylamide, dimethylaminopropyl methacrylamide, acrylic acid, benzylmethacrylamide, and methylthioethylacrylamide.

78. The method of claim 76, wherein the crosslinker is selected from the group consisting of N, N'-bis(acryloyl)cystamine, vinyl groups, allyl groups, cinnamates, acrylates, diacrylates, oligoacrylates, methacrylates, dimethacrylates,

oligomethoacrylates, methylenebisacrylamide, methylenebismethacrylamide, esters of unsaturated mono- or polycarboxylic acids with polyols, trimethylolpropane triacrylate, allyl compounds, vinyl compounds, stilbene derivatives, azo derivatives, cinnamoyl derivatives, and combinations thereof.

79. The method of claim 76, wherein the crosslinker is a disulfide linker.

80. The method of claim 69, wherein the hydrogel can be reduced to form a solution.

81. The method of claim 80, wherein the hydrogel can be reduced by the addition of a reducing agent.

82. The method of claim 80, wherein the solution can be oxidized to reform the hydrogel.

83. The method of claim 82, wherein the solution can be oxidized by atmospheric oxygen, or light and riboflavin.

84. The method of claim 69, wherein the hydrogel comprises a copolymer, wherein said copolymer forms a hydrogel when exposed to light at a first wavelength and forms a solution when exposed to light at a second wavelength.

85. The method of claim 69, wherein the refractive index can be changed by changing the concentration of nanoparticles in the hydrogel.

86. The method of claim 69, wherein the nanoparticles are selected from the group consisting of nanogels, proteins, silica, metals, such as gold, silver, and any transition metals, TiO_2, ceramics, or combinations thereof.

87. A method of making an artificial lens comprising the step of

a) providing a lens from the eye of an animal;

b) evacuating the lens to retain a capsular bag;

c) providing a reversible hydrogel in liquid state;

d) adding nanoparticles to the reversible hydrogel in liquid state to form a dispersion;

e) introducing dispersion into the capsular bag; and

d) gelling the dispersion inside the capsular bag.

88. The method of claim 87, wherein the hydrogel is a reversible hydrogel.

89. The method of claim 87, wherein the nanoparticles is selected from the group consisting of nanogel, protein, silica, gold, silver, TiO2, any transition metals, ceramic, or combinations thereof.

90. The method of claim 87, wherein the nanoparticles do not disperse or scatter visible light.

91. The method of claim 87, wherein the nanoparticles have particle sizes less than about 150 nm.

92. The method of claim 87, wherein the nanoparticles have particle sizes of about 3-20 nm.

93. The method of claim 87, wherein the hydrogel is reversible and comprises a copolymer, wherein said copolymer is a hydrogel when in an oxidized state and is a solution when in a reduced state.

94. The method of claim 93, wherein the copolymer is produced by polymerization of a monomer with a crosslinker or a polymer derivatized to contain reversible crosslinking.

95. The method of claim 94, wherein the monomer is selected from the group consisting of acrylamide, N-ornithine acrylamide, N-(2-hydroxypropyl)acrylamide, hydroxy-ethylacrylate, hydroxyethylmethacrylate, polyethyleneglycol acrylates, polyethyleneglycol methacrylates, N-vinyl pyrolidone, N-phenylacrylamide, dimethylaminopropyl methacrylamide, acrylic acid, benzylmethacrylamide, and methylthioethylacrylamide.

96. The method of claim 94, wherein the crosslinker is selected from the group consisting of N, N'-bis(acryloyl)cystamine, vinyl groups, allyl groups, cinnamates, acrylates, diacrylates, oligoacrylates, methacrylates, dimethacrylates, oligomethoacrylates, methylenebisacrylamide, methylenebismethacrylamide, esters of unsaturated mono- or polycarboxylic acids with polyols, trimethylolpropane

triacrylate, allyl compounds, vinyl compounds, stilbene derivatives, azo derivatives, cinnamoyl derivatives, and combinations thereof.

97. The method of claim 94, wherein the crosslinker is a disulfide linker.

98. The method of claim 87, wherein the hydrogel can be reduced to form a solution.

99. The method of claim 98, wherein the hydrogel can be reduced by the addition of a reducing agent.

100. The method of claim 98, wherein the solution can be oxidized to reform the hydrogel.

101. The method of claim 100, wherein the solution can be oxidized by atmospheric oxygen, or light and riboflavin.

102. The method of claim 87, wherein the hydrogel comprises a copolymer, wherein said copolymer forms a hydrogel when exposed to light at a first wavelength and forms a solution when exposed to light at a second wavelength.

103. The method of claim 87, wherein the refractive index can be changed by changing the concentration of nanoparticles in the hydrogel.

104. The method of claim 87, wherein the nanoparticles are selected from the group consisting of nanogels, proteins, silica, metals, such as gold, silver, and any transition metals, TiO_2, ceramics, or combinations thereof.